Aviation Investigation Final Report

Location:	Eagle River, Alaska	**Accident Number:**	ANC21FA065
Date & Time:	July 26, 2021, 13:20 Local	**Registration:**	N65698
Aircraft:	Cessna 172P	**Aircraft Damage:**	Substantial
Defining Event:	Controlled flight into terr/obj (CFIT)	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

The pilot and flight instructor departed on a 2-hour discovery flight and did not return. The wreckage was subsequently located nearly 9 hours after the airplane's scheduled return time in an area of rocky, mountainous terrain. The airplane sustained substantial damage to the fuselage and left wing.

No pre-accident engine or airframe mechanical malfunctions or anomalies were found that would have precluded normal operation. The carburetor "heat valve" was observed in the ON/HOT position, and was captured in this position due to the deformation of the surrounding heat box material, consistent with the absorption of impact energy. The propeller remained attached at the crankshaft. Each blade was missing about 2 inches of the blade tip and exhibited leading-edge gouging and torsional twisting, chordwise striations across the cambered surface, and trailing edge "S" bending, all of which is consistent with rotation under power at the time of impact.

The temperature and dewpoint in the area of the accident site around the time of the accident were consistent with a moderate risk of serious carburetor icing at cruise power settings and severe icing at glide power settings.

Although the airplane's emergency locator transmitter (ELT) emitted a signal the day after the accident, which was detected by search and rescue personnel, no signal was detected immediately after the accident. During postaccident examination of the ELT, when in the ON mode, the ELT activated and transmitted on both 121.5 and 406MHz. When tested in the ARMED mode, the ELT transmitted only once out of numerous tests.

The ELT installed in the airplane was an AmeriKing AK-451 ELT that was the subject of a Federal Aviation Administration (FAA) airworthiness directive (AD) which required annual

testing as a result of an unapproved parts investigation. The AD was prompted by multiple reports of ELT failures and a report of noncompliance to quality standards and manufacturer processes. The AD further stated that failure to adhere to the standards and processes could result in ELTs that would not function, similar to the circumstances in this accident.

A review of the airplane's maintenance records revealed an entry showing compliance with the AD about 19 months before the accident. An entry with the same date indicated that the ELT was replaced with a different make and model. An entry dated about 6 months before the accident indicated that the ELT was tested in accordance with 91.207(d) and the AD compliance sheet was up-to-date.

Since the maintenance records indicated that the AD-affected ELT had been removed and replaced with a unit not affected by the AD, the required testing was likely not accomplished; therefore, the faults with the ELT were not discovered. Had the ELT functioned as designed, emergency personnel would have been alerted to the accident, even if the company did not report it overdue. Similarly, had the AD-affected ELT been removed and replaced with a functional unit as was noted in the maintenance records, the search and rescue response likely would have been faster; however, whether faster location of the wreckage would have prevented a fatal outcome could not be determined.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

An inflight collision with terrain under unknown circumstances. Contributing to the delayed rescue response was the failure of the emergency locator transmitter (ELT) to activate as designed, and the mechanic's failure to ensure the correct ELT was installed and all applicable airworthiness directives complied with in accordance with federal regulations.

Findings

Aircraft	Intake anti-ice, deice - Related operating info
Environmental issues	Conducive to carburetor icing - Effect on equipment
Personnel issues	Understanding/comprehension - Pilot
Aircraft	Emergency locator beacon - Failure
Aircraft	Emergency locator beacon - Inadequate inspection
Personnel issues	Scheduled/routine inspection - Maintenance personnel
Personnel issues	Aircraft/maintenance logs - Maintenance personnel

Factual Information

History of Flight

Enroute	Controlled flight into terr/obj (CFIT) (Defining event)

On July 26, 2021, about 1320 Alaska daylight time (AKDT), a Cessna 172P airplane, N65698, was substantially damaged when it was involved in an accident near Eagle River, Alaska. The flight instructor and private pilot received fatal injuries. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 instructional flight.

The flight, operated by Angel Aviation Inc., Anchorage, Alaska, originated from Merrill Field Airport (MRI), Anchorage, Alaska, about 1215. The flight, reserved as a "discovery flight," was scheduled to last from 1200 until 1400.

After departing MRI, the airplane proceeded northbound near Palmer, Alaska, before turning towards the Knik Glacier. When the airplane did not arrive back at MRI, a concerned family member referenced a tracking application which showed the airplane had stopped moving in the area of the Eagle River Valley, and notified authorities.

About 1700, an alert notice (ALNOT) was issued and a search was initiated, and the wreckage was located about 2245 in an area of steep, rising glacial terrain at an elevation of about 3,100 ft mean sea level (msl). Although the ALNOT listed a destination of Girdwood, Alaska, the flight had been planned to return to MRI. The reason for the listing of Girdwood could not be determined.

Flight instructor Information

Certificate:	Commercial; Flight instructor	**Age:**	23,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	June 1, 2018
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 500 hours (Total, all aircraft)		

Pilot-rated passenger Information

Certificate:	Private	**Age:**	27,Female
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):		**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):		**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	February 1, 2019
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N65698
Model/Series:	172P	**Aircraft Category:**	Airplane
Year of Manufacture:	1982	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	17275822
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:		**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	LYCOMING
ELT:		**Engine Model/Series:**	0-320 SERIES
Registered Owner:	ANGEL AVIATION INC	**Rated Power:**	180 Horsepower
Operator:	ANGEL AVIATION INC	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	PAFR,388 ft msl	**Distance from Accident Site:**	16 Nautical Miles
Observation Time:	12:58 Local	**Direction from Accident Site:**	285°
Lowest Cloud Condition:	Few / 2800 ft AGL	**Visibility**	9 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.94 inches Hg	**Temperature/Dew Point:**	17°C / 9°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Anchorage, AK (MRI)	**Type of Flight Plan Filed:**	None
Destination:	Eagle River, AK	**Type of Clearance:**	Unknown
Departure Time:	12:15 Local	**Type of Airspace:**	Class G

The National Weather Service, Ted Stevens Anchorage International Airport (PANC) 1600 sounding depicted a lifted condensation level (LCL) and level of free convection at 3,294 ft above ground level (agl), with a convective condensation level at 4,623 ft agl, which supported few to scattered clouds at the LCL at about 2,700 ft agl and a broken layer about 4,600 ft agl. The freezing level was identified above 8,000 ft. The sounding indicated several temperature

inversions below 10,000 ft, with the atmosphere characterized as stable with a lifted index of 3.4, and the precipitable water content of 0.79 inches. The sounding supported a moderate to severe risk of carburetor type icing from the surface through 7,000 ft, based on the temperature and relative humidity profiles.

Figure 1 is a carburetor icing probability chart depicting the potential for carburetor icing given the conditions reported at Birchwood Airport at the time of the accident, which were similar to the conditions reported at PANC, Elmendorf Air Force Base, and Palmer Airport. The chart indicated a moderate risk of serious carburetor icing (green) conditions at cruise power and severe at glide power and bordered the severe category (blue) for serious icing at any power setting.

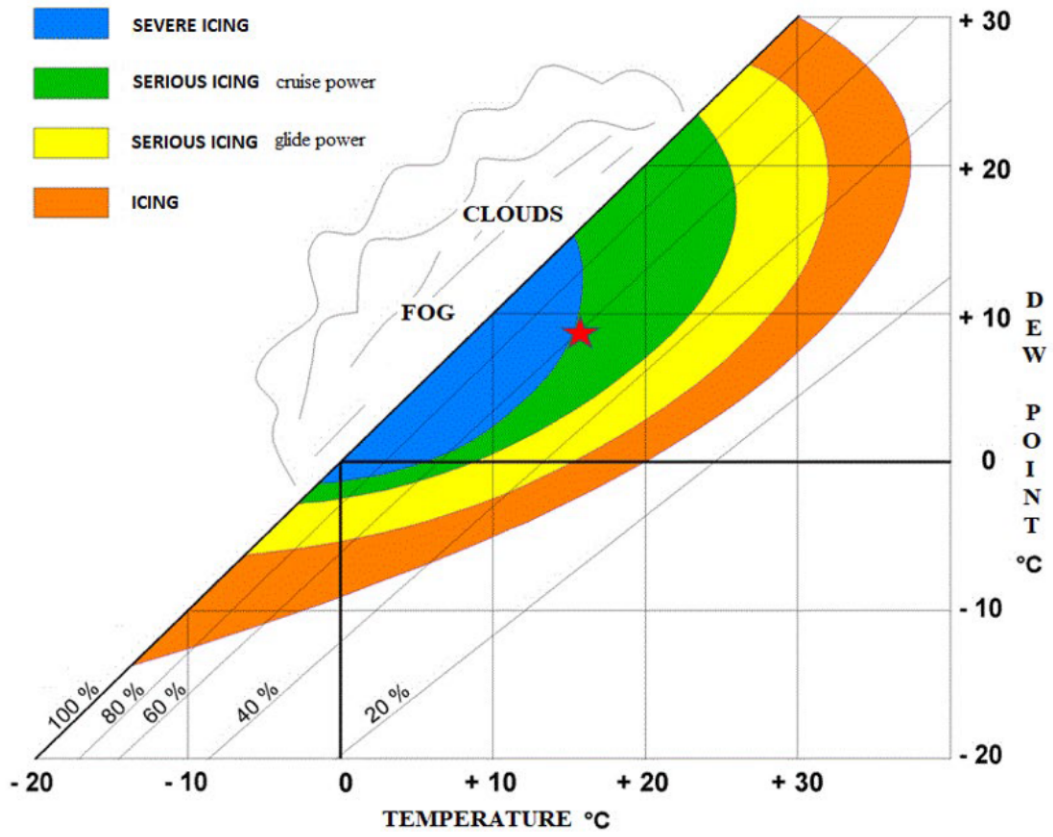

Figure 1: Carburetor Icing Probability Chart

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	61.198351,-149.13063

The airplane sustained substantial damage to the fuselage and left wing. A post-accident examination revealed that all major components remained attached at their respective attach points. The propeller remained attached at the crankshaft and each blade was missing about 2 inches of the blade tip and exhibited leading-edge gouging, torsional twisting, chordwise striations across the cambered surface and trailing edge “S” bending. Flight control continuity was established from all control surfaces to the cockpit. Internal engine continuity was confirmed through rotation of the propeller. The carburetor, induction system, and airbox remained free of pre-impact obstructions to airflow. The carburetor “heat valve” was observed to be in the ON/HOT position and was “captured” in this position due to the deformation of the surrounding heat box material due to impact.

Medical and Pathological Information

At the time of the accident, the flight instructor was wearing an Apple Watch, which recorded pulse data. The last recorded pulse data recovered from the watch were from between 1500 to 1600 on the day of the accident. The level of accuracy of the pulse recording was unknown.

Survival Aspects

The airplane was equipped with an Ameri-King Corporation AK-451-2 emergency locator transmitter (ELT) marked certified in accordance with technical standards order (TSO) C-126 and C091(a). The ELT remained secure in its cradle and the wires and antenna remained

attached. During the search, no signals were received from the 406MHz or 121.5MHz system. The day after the accident, when there were no personnel near the wreckage, the ELT began emitting a signal, which was received by the Alaska Rescue Coordination Center. During a postaccident examination of the ELT, when in the “ON” mode, the ELT activated and transmitted on both 121.5 and 406MHz. When tested in the “ARMED” mode, the ELT transmitted only once out of numerous tests.

In 2015, the FAA determined Ameri-King Corp., manufactured, sold, or distributed parts and articles for installation on FAA type certificated aircraft which did not conform to an approved design, but were represented as FAA-approved. On December 28, 2015, the FAA issued an emergency cease-and-desist order to Ameri-King Corp., terminating their technical standard order authorization (TSOA) and parts manufacturer approval (PMA). The emergency cease and desist order required Ameri-King Corp. to immediately cease and desist manufacturing, selling, and distributing any parts and articles for installation on FAA type-certificated aircraft. Prohibited activities also included advertising, repairing, rebuilding, and altering any articles intended for installation on type certificated products.

According to the FAA, based on the investigation that led to the issuance of the emergency cease-and-desist order, the FAA was not confident parts and articles manufactured by Ameri-King Corp. prior to December 28, 2015, were manufactured in accordance with approved design. Following the cease-and-desist order, the FAA subsequently issued an unapproved parts notification and airworthiness directive (AD), which applied to the ELT installed on the airplane at the time of the accident. AD-17-16-01 stated, in part: “This AD was prompted by multiple reports of ELT failure. This AD was also prompted by a report of noncompliance to quality standards and manufacturer processes related to Ameri-King Corporation ELTs. Failure to adhere to these standards and processes could result in ELTs that do not function. We are issuing this AD to detect and correct nonfunctioning ELTs, which, if not corrected, could delay or impede the rescue of the flightcrew and passengers after an emergency landing.”

As part of the AD, a testing process was developed that was to be completed within 12 months of the issuance of the AD, and repeated at intervals not to exceed 12 months.

A review of the aircraft maintenance records, specifically the AD compliance sheet, revealed an entry showing compliance with AD-17-16-01 on January 3, 2020. A maintenance entry dated January 3, 2020, stated, “Replaced ELT with Artex ELT 1000 P/N A3-06-2749-1 battery due 12/2026.” The next entry, dated January 22, 2021, stated “Tested ELT IAW 91.207(d), ELT battery due 12/2026. AD compliance sheet verified and up to date.”

Administrative Information

Investigator In Charge (IIC):	Williams, David
Additional Participating Persons:	Jennifer Barclay; Textron Aviation; Wichita, KS Mark Platt; Lycoming Engines; Williamsport, PA Ty Watts; FAA; Anchorage, AK
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Investigation Class:	Class 3
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=103564

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, "accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties … and are not conducted for the purpose of determining the rights or liabilities of any person" (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB's statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available here.